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IS 14383 (1996): Silicone Greases [PCD 3: Petroleum, Lubricants and their Related Products]

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भारतीय मानक

सिलिकॉन ग्रीज — विशिष्टि

Indian Standard

SILICONE GREASES — SPECIFICATION

ICS 75.100

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 1996

Price Group 2

Lubricants and Related Products Sectional Committee, PCD 4

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Silicone greases are widely used for lubrication of mechanisms operating at extreme temperatures for extended period of time. These greases are characterised by their oxidation stability at elevated temperature and low rates of consistency change with temperature. They are suitable for the lubrication of antifriction bearings and other mechanisms at temperatures of –40 to 200°C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SILICONE GREASES — SPECIFICATION

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for greases made out of synthetic fluids commercially known as silicone fluids which are polymers of dimethyl siloxanes or copolymers of methyl and phenyl or alkyl or chlorophenyl methyl siloxanes.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which through reference in this text constitute the provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
460 (Part 1) : 1985	Specification for test sieves : Part 1 Wire cloth test sieves (*third revision*)
1447 : 1966	Methods of sampling of petroleum and its products
1448	Methods of test for petroleum and its products:
[P:25] : 1976	Determination of kinematic and dynamic viscosity (*first revision*)
[P:32] : 1992	Density and relative density (*second revision*)
[P:51] : 1963	Copper strip corrosion test for lubricating greases
[P:52] : 1971	Drop point (*first revision*)
[P:60] : 1994	Consistency of lubricating greases by cone penetrometer (*second revision*)
[P:62] : 1974	Heat stability of greases (*first revision*)
[P:68] : 1967	Evaporation loss in greases (22 hour drying)
[P:90] : 1979	Test for water washout characteristics of lubricating greases
[P:94] : 1980	Test for oxidation stability of lubricating greases by the oxygen bomb method

3 GRADES

There shall be three grades depending upon the consistency of the silicone grease:

i) light,
ii) medium, and
iii) heavy.

4 REQUIREMENTS

4.1 General

The material shall be uniform in consistency and free from objectionable odour, grit and impurities or deleterious materials.

4.2 Composition

The material shall be made from silicone fluid of viscosity 300 to 1 000 cSt at 25°C, when tested as per IS 1448 [P : 25] :1976, with suitable thickening agents and may contain additives.

4.3 The material shall also comply with the requirements given in Table 1, when tested according to methods mentioned in col 6 and 7.

5 KEEPING PROPERTIES

The material when stored in original sealed containers under covered storage shall retain the properties described under **4** for a period of not less than one year from the date of manufacture.

6 PACKING AND MARKING

6.1 Packing

The material shall be packed in suitable containers as agreed to between the purchaser and the supplier.

6.2 Marking

The containers shall be marked with the following:

a) Name and grade of the material;
b) Indication of the source of manufacture;
c) Net mass in the container;
d) Date of manufacture;
e) Recognized trade-mark, if any; and
f) Batch number or code number.

6.3 BIS Certification Marking

Each container may also be marked with the Standard Mark.

6.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 1447 : 1966.

Table 1 Requirements for Silicone Greases

(*Clause* 4.3)

Sl No.	Characteristic	Requirement			Method of Test, Ref to	
		Light	Medium	Heavy	Annex	[P:] of IS 1448
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Appearance	Smooth and homogeneous free from grit and abrasive matter			—	—
ii)	Consistency of the worked (60 x) material at 25 ± 0.5°C				—	P:60[1]
	a) 60 double strokes	310 - 340	265 - 295	220 - 250		
	b) 100 000 double strokes	Shall not differ by more than 20 units from 60 double strokes value			A	
iii)	Low temperature torque at –20°C				—	P:[2]
	Starting torque, g/cm	5 000	5 000	5 000		
	Running torque, g/cm	1 000	1 000	1 000		
iv)	Drop point, °C, *Min*	210	210	210	—	P:52
v)	Evaporation loss at 180 ± 2°C for 22 h, percent by mass, *Max*	5	5	5	—	P:68
vi)	Heat stability	No sign of breakdown of structure and separation of silicone fluid or any carbonisation				
	a) 200°C, for 3 h				—	P:62
	b) Weight loss in 14 days, percentage, *Max*	3	3	3	—	P:68
vii)	Bleed test at 150°C for 24 ± 1 h, percent by mass, *Max*	5	5	5	B	—
viii)	Water washout characteristics at 80°C, percent by mass, *Max*	2	2	2	—	P:90
ix)	Copper strip corrosion at 100°C for 24 h	No pitting, etching or dark-brown, green black, no stain slight tarnishing permissible			—	P:51
x)	Oxidation stability by Bomb method, Drop in pressure after 100 h, kg/cm^2, *Max*	0.35	0.35	0.35	—	P:94
xi)	Silicone oil extracted from grease:					
	a) Kinematic viscosity at 25°C, in centistokes	300 - 1 000	300 - 1 000	300 - 1 000	—	P:25
	b) Relative density	To be reported			—	P:32

[1] P:60 may also be followed if agreed between the purchaser and the supplier.

[2] Under preparation. Till such time IP 186/85 shall be followed.

ANNEX A

[*Table* 1, *Sl No.* (ii)(b)]

DETERMINATION OF PENETRATION AFTER 100 000 DOUBLE STROKES IN A GREASE WORKER

A-1 APPARATUS

A-1.1 Penetrometer — Same as given in IS 1448 [P:60]:1994.

A-1.2 Cone — Same as given in IS 1448 [P:60]:1994.

A-1.3 Grease Worker — Same as given in IS 1448[P:60]:1994.

A-1.4 Constant Temperature Bath — Same as given in IS 1448 [P:60]:1994.

A-2 PROCEDURE

A-2.1 Maintain the temperature of the room used for the test within range of 15 to 30°C and keep the material in the room for sufficient time to bring it to the room temperature. Transfer sufficient quantity of the material to the clean grease worker cup, fill it heaping full, taking care to avoid as far as possible inclusion of air.

A-2.2 Assemble the mechanically worked grease worker and work the grease at a rate of 60 double strokes per mintue for 100 000 double strokes. Make the first downward stroke with the vent cock open to avoid building up of serious pressure when the plunger enters the grease worker cup. As soon as the working is complete, place the cup in the constant temperature bath and allow to stand for 90 minutes to bring it to 25 ± 1°C temperature.

A-2.3 Replace the grease cup again to mechanical worker and subject the grease for a further 60 double strokes. Remove the top and plunger and return to the grease worker cup as much of the material clinging to the plunger as may readily be removed. Prepare a smooth surface, taking care to avoid the formation of air pockets. Determine immediately the penetration as given in IS 1448[P:60]:1994.

A-3 PRECISION

A-3.1 Results of duplicate tests should not differ by more than the following amounts:

Repeatability	*Reproducibility*
—	11 percent of lower value

ANNEX B

[*Table* 1, *Sl No.* (vii)]

BLEED TEST

B-1 GENERAL

B-1.1 This method describes a procedure for measuring the tendency of the oil in lubricating greases to separate at elevated temperature under static conditions.

B-2 APPARATUS

B-2.1 Cone

Made out of woven nickel or stainless steel wire, and conforming to the dimensions shown in Fig. 1. The wire cloth shall comply with the requirements prescribed for 250-micron IS Sieve [*see* IS 460(Part 1):1985].

B-2.2 Beaker

200 ml capacity, tall-form without a pouring spout and equipped with a close-fitting cover with a hook on the underside for suspending the cone.

B-2.3 Oven

Electrically heated, gravity convection, maintained at a temperature of 150 ± 1°C.

B-3 PROCEDURE

B-3.1 Weigh about 10 g of the material accurate to the nearest 0.1 g into the cone. Make exposed surface of the grease smooth and convex to prevent trapping of free oil. Then suspend the cone in the clean, tared beaker by means of the wire handle and hook on the underside of the cover. Place the cone and beaker in the oven. At the end of 24 hours, remove the assembly from the oven and allow to cool to room temperature. When the assembly has reached room temperature, lift the cone from the beaker and gently tap against the inside of the beaker to remove any oil adhering to the tip of the cone. Weigh the beaker containing the oil which has separated.

B-3.2 Carry out the test in triplicate.

B-4 CALCULATION

$$\text{Bleed, percent loss in mass} = \frac{100\,(A - B)}{M}$$

where

A = mass in g of the beaker containing the separated oil;
B = mass in g of the beaker, and
M = mass in g of the material taken for the test.

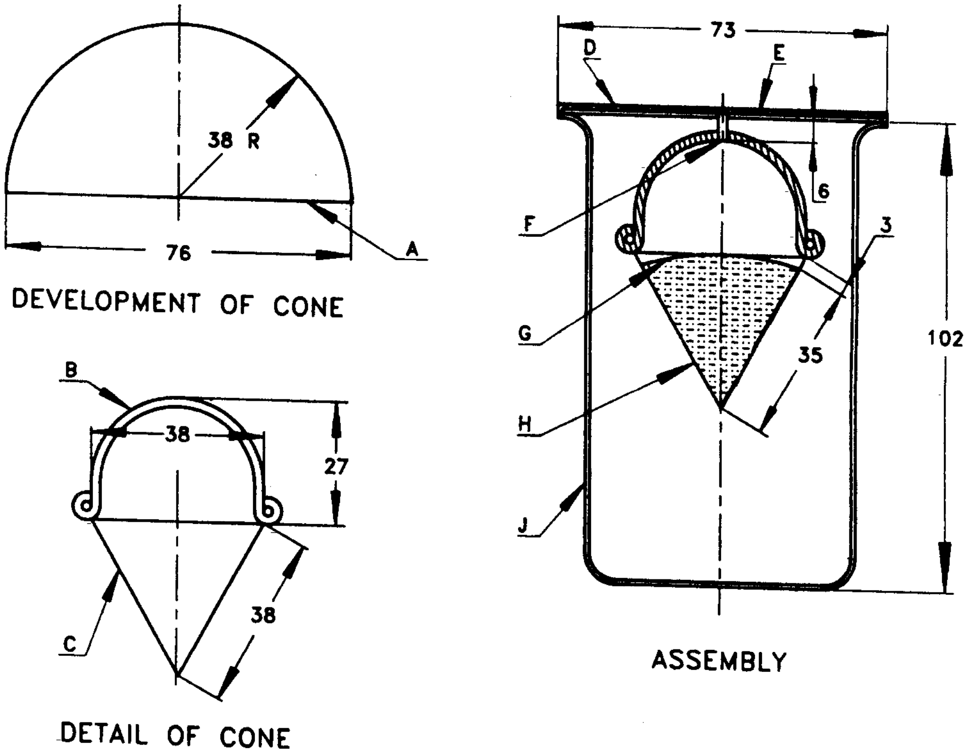
B-5 REPORTING

Report the geometric mean of the three test results.

B-6 PRECISION

When duplicate test results, each being the geometric mean of three determinations, are obtained the larger result should not exceed the smaller by more than the following amounts:

Repeatability	*Reproducibility*
20 percent of the smaller amount	60 percent of the smaller amount



DEVELOPMENT OF CONE

DETAIL OF CONE

ASSEMBLY

All dimensions in millimetres.

A = Silver solder along this line.
B = 20-Gauge nickle or stainless steel wire.
C = Nickel or stainless steel wire cloth of 251 microns aperture.
D = 2.4 mm thick copper LID.
E = 1.5 mm rubber gasket.
F = 16-Gauge copper wire hook.
G = Convex surface formed with spatula to prevent trapping of free oil.
H = Grease sample.
J = 200 ml beaker without pouring spout.

FIG. 1 APPARATUS FOR TESTING HEAT STABILITY

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